REMARKS

This paper is being filed in response to the Office Action dated July 29, 2003 that was issued in connection with the above-identified patent application. Applicants also enclose herewith an Information Disclosure Statement and Form PTO-1449 and the fee required pursuant to 37 C.F.R. §§ 1.17(p) and 1.97(c)(2). Applicants additionally enclose a Petition for Extension of Time pursuant to 37 C.F.R. §1.136(a) and the fee required under 37 C.F.R. §1.17(a)(3). In addition, Applicants enclose herewith a Sequence Listing in paper and computer-readable form. Applicants further enclose a substitute Declaration for inventor Shay Caspi. Applicants respectfully request reconsideration of the instant application in view of the amendments and remarks presented herein.

Claims 1-12 are pending in the instant application. Claims 1-12 have been cancelled herein without prejudice. Claims 13-29 have been added. Thus, upon entry of this amendment claims 13-29 will be pending.

Support for claim 13 may be found, for example, at page 5, lines 19-20, page 10, lines 6-16, Figure 2, and original claim 4. Support for claim 14 may be found, for example, at page 10, lines 1-16, Figure 2, Figure 3B, and original claim 12. Support for claim 15 may be found, for example, at page 11, line 5 to page 12, line 15 and original claim 12. Support for claim 16 may be found, for example, at page 5, lines 17-18, page 7, line 9 to page 8, line 2, and original claim 2. Support for claim 17 may be found, for example, at page 5, lines 17-18 and original claim 3. Support for claim 18 may be found, for example, at page 13, lines 6-8, Figure 4, and original claim 5. Support for claim 19 may be found, for example, at page 6, line 1, page 13, lines 1-23, Figure 5A, and original claim 6. Support for claim 20 may be found, for example, at page 6, lines 2-5, page 13, lines 1-23, Figure 5A, and original claim 7. Support for claim 21

may be found, for example, at page 6, lines 2-5, page 13, lines 1-23, Figure 5A, and original claim 8. Support for claim 22 may be found, for example, at page 6, line 1, page 13, line 24 to page 14, line 13, Figures 5B and 7, and original claim 9. Support for claim 23 may be found, for example, at page 13, lines 24-27, Figure 5B, and original claim 10. Support for claim 24 may be found, for example, at page 10, lines 6-16, Figure 2, and original claim 1. Support for claim 25 may be found, for example, at page 16, lines 6-8 and original claim 11. Support for claim 26 may be found, for example, at page 5, lines 17-18, page 7, line 9 to page 8, line 2, and original claim 2. Support for claim 27 may be found, for example, at page 5, lines 17-18 and original claim 3. Support for claim 28 may be found, for example, at page 13, lines 6-8, Figure 4, and original claim 5. Support for claim 29 may be found, for example, at page 14, line 14 to page 15, line 27, and original claim 12. Therefore, new claims 13-28 are fully supported by the specification as filed and do not constitute new matter.

Sequence Listing Declaration

Applicants submit herewith a Sequence Listing in paper and computer readable form. I hereby state that the content of the paper and computer readable copies of the Sequence Listing submitted in accordance with 37 C.F.R. §1.821(c) and (e), are the same. I hereby state that the content of the paper and computer readable copies of the Second Substitute Sequence Listing, submitted in accordance with 37 C.F.R. §1.821(g), herein does not include new matter.

Substitute Inventor Declaration

The Examiner has alleged that the Declaration is defective. Applicants enclose herewith a substitute Declaration for inventor Shay Caspi.

Request to Hold Objection to Title in Abeyance

An objection has been raised to the title of the invention. The Examiner has objected to the title of the invention, which recites "single electron logic elements," as allegedly narrower in scope than some of the pending claims.

According to the Manual of Patent Examining Procedure (MPEP), the title of the invention should be descriptive of the invention **claimed**. *See* MPEP § 606.01. Since the Examiner's objection is directly related to the scope of the claims and no claim has yet been allowed, Applicants respectfully request that the Examiner hold this objection in abeyance until such time as one or more claims have been allowed.

Claims Are Clear and Definite

Claims 1-5, and 11 have been rejected under 35 U.S.C. § 112, second paragraph as allegedly indefinite. The Examiner has alleged that independent claim 1 and dependent claims 2-5 and 11 are vague and indefinite for reciting a "digital computational circuit" without reciting digital or computational network limitations. The Examiner has alleged that the claims are thus confusing and requested clarification.

Applicants traverse this rejection and assert that the new claims are clear and definite. Claims 1-5 and 11 have been cancelled rendering this rejection moot as to these claims. New claims 24-28 partially correspond to cancelled claims 1-5 and 11. However, new claims 24-28 do not recite the terms "computational" and "digital." Applicants, therefore, respectfully request withdrawal of this rejection.

Claim 12 has also been rejected under 35 U.S.C. § 112, second paragraph as allegedly indefinite. The Examiner has alleged that the term "the active cores" at line 16 lacks a clear antecedent basis.

Applicants traverse this rejection and assert that active cores are inherently present in the basic component as clearly described in the specification, for example, at page 9, lines 8-15 and page 10, lines 3-5. Applicants, therefore, respectfully request withdrawal of this rejection.

Claims Are Not Unpatentable over Wang

Claims 1-3 have been rejected under 35 U.S.C. § 102(e) as allegedly anticipated by U.S. Patent No. 6,468,785 to Wang et al. (hereinafter "Wang"). The Examiner has alleged that Wang discloses DNA-based conductive elements as required by instant claim 1. The Examiner has also alleged that the "repetitive" limitation of claim 1 is met by the repetitive measurements of Wang. The Examiner has included claims 2 and 3 in this rejection because the Examiner has alleged that charge movement along a polymer chain of heterologous atoms inherently requires some type of electron hopping or tunneling.

Applicants traverse this rejection and assert that new claims 13-29 are patentable over Wang. Applicants note that claims 1-3 have been cancelled rendering this rejection moot as to the cancelled claims. New claims 24-26 partially correspond to cancelled claims 1-3. Therefore, this rejection will be addressed in light of these claims.

Applicants assert that the hybridization device of Wang is substantially different from the DNA-based transistors of the instant invention. Wang discloses methods and devices for electrochemical detection of nucleic acid hybridization that rely on the change in electronic properties upon duplex formation between a free probe nucleic acid in a conducting polymer and a test nucleic acid. *See e.g.* Wang, col. 3, lines 35-62. Wang specifically indicates that the probe nucleic acid is not bonded directly or indirectly to the conducting polymer in which it is suspended. *See* Wang, col. 3., lines 6-8.

For a reference to anticipate a claim, it must teach each and every element of the claimed invention. Applicants respectfully invite the Examiner's attention to new claim 24 which recites "single electron tunneling transistors." Since Wang completely fails to teach DNA-based transistors, Wang does not anticipate claim 24. Therefore, Applicants respectfully request withdrawal of this rejection.

Claims Are Not Unpatentable over Braun

Claims 1-4 have been rejected under 35 U.S.C. § 102(b) as allegedly anticipated by International Patent Publication No. WO 99/04440 by Braun et al. (hereinafter "Braun"). The Examiner has alleged that Braun discloses DNA-based single electron transistors. Allegedly the single electron transistors of Braun satisfy the "repetitive" limitation of claim 1 in that Figure 6 of Braun depicts repetitive arms.

Applicants traverse this rejection and assert that new claims 13-29 are patentable over Braun. Applicants note that claims 1-4 have been cancelled rendering this rejection moot as to the cancelled claims. New claims 24-26 partially correspond to cancelled claims 1-4. Therefore, this rejection will be addressed in light of these claims.

Braun discloses a single electron transistor consisting of a particle bound to three different oligonucleotides, one of which is bound to the particle by an intervening, non-conducting linker. *See* Braun, page 30, lines 10-14. These oligonucleotides are connected to three electrodes by three fibers. The fibers and the oligonucleotides are connected by duplex formation between complementary nucleotide sequences. *See* Braun, page 30, lines 18-22. These connections may be stabilized with covalent bonds. *See* Braun, page 30, lines 22-24. All three fibers and their respective oligonucleotides are derivitized with a conducting material (i.e.

forming "wires"). See Braun, page 31, lines 1-2. The wire connected to the particle by a non-conducting linker serves as the gate. *See* Braun, page 31, lines 3-5.

Thus, the particle of Braun, which is typically a metal, *see* Braun, page 12, line 14-18, corresponds to the grain of the present invention. By contrast, the grain of the present invention consists of an exposed sugar and base as indicated at page 9, lines 3-5 of the application. In addition, unlike the single electron transistors of the instant invention, the nucleotides of Braun are all coated with a conducting material. Applicants respectfully invite the Examiner's attention to new claim 24, which recites "wherein the active grain consists of a bare DNA segment." Therefore, Braun fails to anticipate the instant claims because, at a minimum, Braun fails to teach uncoated active core nucleotides.

In conclusion, Applicants believe the claims of the instant application are in condition for allowance and earnestly request prompt favorable action. Applicants particularly note that the Examiner indicated that claims 6-10 were objected to as dependent on a rejected claim, but otherwise allowable if rewritten in independent form. Claims 6-10 have been cancelled. However, claims 19-23 correspond to original claims 6-10. Claims 19, 21, and 22 are in independent form.

Applicants enclose herewith the fees required pursuant to 37 C.F.R. §§ 1.17(p) and 1.97(c)(2) (Information Disclosure Statement), § 1.17(a)(3) (three-month extension of time), and § 1.16(b) (more than 3 independent claims). While Applicants do not believe that any additional fees are required with this paper, the Commissioner is hereby authorized to charge any fees occasioned by this submission not otherwise enclosed herewith to Deposit Account No. 02-4377. Please credit any overpayment of fees associated with this filing to the above-identified deposit account. A duplicate of this page is enclosed.

Respectfully submitted,

BAKER BOTTS, L.L.P.

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Enclosures